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Climate science statement

24 November 2009

A statement from the Met Office, Natural Environment Research Council and the Royal Society.

The UK is at the forefront of tackling dangerous climate change, underpinned by world-class scientific expertise and advice. Crucial decisions will be taken soon in Copenhagen about limiting and reducing the impacts of climate change, now and in the future. Climate scientists from the UK and across the world are in overwhelming agreement about the evidence of climate change, driven by the human input of greenhouse gases into the atmosphere.

As three of the UK's leading scientific organisations, involving most of the UK scientists working on climate change, we cannot emphasise enough the body of scientific evidence that underpins the call for action now, and we reinforce our commitment to ensuring that world leaders continue to have access to the best possible science. We believe this will be essential to inform sound decision-making on policies to mitigate and adapt to climate change up to Copenhagen and beyond.

The 2007 Assessment Report of the UN's climate change panel (the IPCC) — made up of the world's foremost climate scientists — provided unequivocal evidence for a warming climate, and a high degree of certainty that human activities are largely responsible for global warming since the middle of the 20th century. However, the IPCC process is based only on information already published and even since the last Assessment Report the scientific evidence for dangerous, long-term and potentially irreversible climate change has strengthened significantly.

- Global carbon dioxide concentrations continue to rise, and methane concentrations have started to increase again after a decade of near stability;
- The decade 2000–2009 has been warmer, on average, than any other decade in the previous 150 years;
- Observed changes in precipitation (decreases in the subtropics and increases in high latitudes) have been at the upper limit of model projections;
- Arctic summer sea-ice cover declined suddenly in 2007 and 2008, prompting the realisation that this environment may be far more vulnerable to change than previously thought;
- There is increasing evidence of continued and accelerating sea-level rises around the world.

We expect some of the most significant impacts of climate change to occur when natural variability is exacerbated by long-term global warming, so that even small changes in global temperatures can produce damaging local and regional effects. Year-on-year the evidence is growing that damaging climate and weather events — potentially intensified by global warming — are already happening and beginning to affect society and ecosystems. This includes:

- In the UK, heavier daily rainfall leading to local flooding such as in the summer of 2007;
- Increased risk of summer heatwaves such as the summer of 2003 across the UK and Europe;
- Around the world, increasing incidence of extreme weather events with unprecedented levels of damage to society and infrastructure. This year's unusually destructive typhoon season in South-East Asia, while not easy to attribute directly to climate change, illustrates the vulnerabilities to such events;
- Sea-level rises leading to dangerous exposure of populations in, for example, Bangladesh, the Maldives and other island states;
- Persistent droughts, leading to pressures on water and food resources, and the increasing incidence of forest fires in regions where future projections indicate long-term reductions in rainfall, such as south-west Australia and the Mediterranean.

These emerging signals are consistent with what we expect from our projections, giving us confidence in the science and models that underpin them. In the absence of action to mitigate climate change, we can expect much larger changes in the coming decades than have been seen so far.

Some countries and regions are already vulnerable to climate variability and change, but in the coming decades all countries will be affected, regardless of their affluence or individual emissions. Climate change will have major consequences for food production, water availability, ecosystems and human health, migration pressures, and regional instability. In the UK, we will be affected both directly and indirectly, through the effects of climate change on, for example, global markets (notably in food), health, extent of flooding, and sea levels.

The accumulation of carbon dioxide in the atmosphere will lead to long-term changes in the climate system that will persist for millennia. Our growing understanding of the balance of carbon between the atmosphere, oceans and terrestrial systems tells us that the greater the accumulation of carbon dioxide in the atmosphere, the greater the risk of long-term damage to Earth's life-support systems. Known or probable damage includes ocean acidification, loss of rain forests, degradation of ecosystems, and desertification. These effects will lead to loss of biodiversity and reduced agricultural productivity. Reducing emissions of greenhouse gases can substantially limit the extent and severity of long-term climate change.

Summary
The 2007 IPCC Assessment, the most comprehensive and respected analysis of climate change to date, states clearly that without substantial global reductions of greenhouse gas emissions we can likely expect a world of increasing droughts, floods and species loss, of rising seas and displaced human populations. However, even since the 2007 IPCC Assessment the evidence for dangerous, long-term and potentially irreversible climate change has strengthened. The scientific evidence which underpins calls for action at Copenhagen is very strong. Without co-ordinated international action on greenhouse gas emissions, the impacts on climate and civilisation could be severe.

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